

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
5 April 2001 (05.04.2001)

PCT

(10) International Publication Number
WO 01/24522 A1

(51) International Patent Classification⁷: **H04N 7/14**

(21) International Application Number: **PCT/JP00/06500**

(22) International Filing Date:
22 September 2000 (22.09.2000)

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:
11/275515 29 September 1999 (29.09.1999) **JP**

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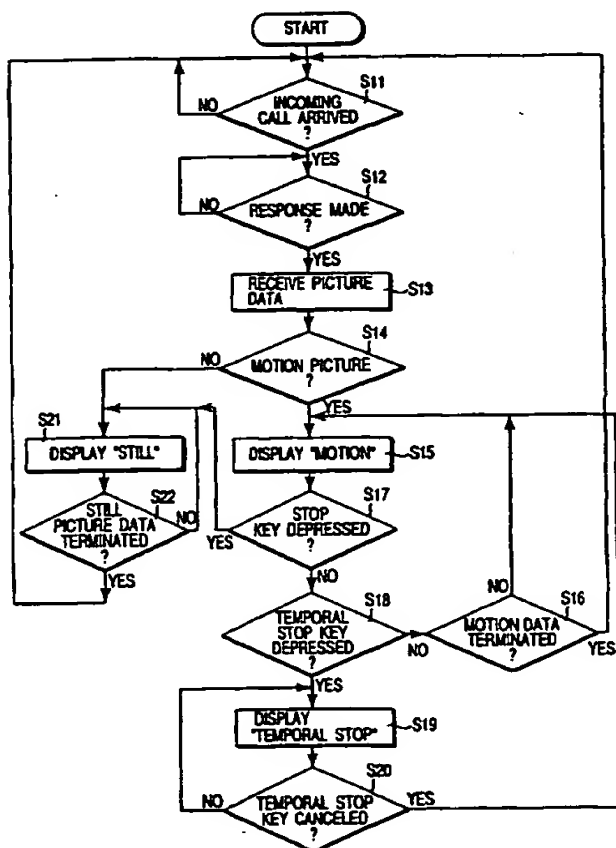
(81) Designated State (national): **US.**

(84) Designated States (regional): **European patent (DE, FR, GB).**

Published:
— With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: **RADIO VIDEO COMMUNICATION TERMINAL**



(57) Abstract: A video communication mode detecting section detects whether the current video communication mode is the motion picture communication mode in which a motion picture is handled and the still picture communication mode in which a still picture is handled. A video communication mode display instructing section displays the video communication mode detected by the video communication mode detecting section using an LCD. As a result, the LCD displays a picture received by a receiver and "MOTION" (motion picture communication mode) or "STILL" (still picture communication mode) indicating the current video communication mode.

WO 01/24522 A1

D E S C R I P T I O N

RADIO VIDEO COMMUNICATION TERMINAL

5

Technical Field

The present invention relates to a radio communication terminal capable of communicating video information.

Background Art

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In recent years, in radio terminals used in cellular phone radio systems, radio video communication terminals capable of communicating video information are being realized.

15

Some of these radio video communication terminals capable of communicating video information have a motion picture communication mode in which motion pictures are communicated and a still picture communication mode in which still picture are communicated as video communication modes.

20

In the radio video communication terminals having the motion picture communication mode and the still picture communication mode, control is performed in such a way that the two video communication modes are switched through an operation by a user or the two video communication modes are switched automatically according to communicating conditions.

25

Sometimes such radio video communication terminals

using radio channels suspend the reception of a motion picture and display on their display unit a still picture rather than a motion picture, which looks like one of frames constituting a motion picture which is displayed in a frame step manner when the radio channel conditions are degraded and a level at which motion picture reception cannot be maintained is reached.

In a state where a still picture is temporarily displayed on the display unit though the current video communication mode is the motion picture communication mode, the user of the radio video communication terminal cannot know that the motion picture communication mode has been set. If the user mistakes the video communication mode for the still picture communication mode in which the load caused by video processing on the terminal is little and consequently makes communication over a long period of time, then a large amount of power will be consumed. Also, if the user mistakes the video communication mode for the still picture communication mode to instruct the terminal to perform another operation, then the radio video communication terminal will further consume power for control of the operation though a large amount of power is consumed by the motion picture communication mode processing. Thus, if another operation is controlled in the motion picture communication mode, a drawback arises in that the load on the control unit

increases very much.

Disclosure of Invention

To solve the above problems it is an object of the present invention to provide a radio video communication terminal which allows the user to always
5 recognize a video communication mode correctly by clearly informing the user of that video communication mode.

In order to achieve the above object, according to an aspect of the present invention, there is provided a
10 radio video communication terminal which communicates video over a radio channel in a motion picture communication mode or a still picture communication mode, comprising: video communication mode detecting
15 means for detecting a video communication mode in which the terminal is communicating; and informing means for informing a user at the terminal of the video communication a mode detected by the video communication mode detecting means.

20 According to another aspect of the present invention, there is provided a radio video communication terminal which communicates video over a radio channel in a motion picture communication mode or a still picture communication mode, comprising: radio
25 communication means including transmitting means for transmitting information containing video information over the radio channel and receiving means for

receiving information containing video information over the radio channel; input means for inputting data for controlling the operation of the radio communication terminal; display means for displaying the inputted data and information containing picture data received by the radio communication means; first display control means for controlling the display means so as to display the image data received by the radio communication means; video communication mode detecting means for detecting a video communication mode in which the terminal is communicating; and second display control means for controlling the display means so as to display the video communication mode detected by the video communication mode detecting means.

15 In one embodiment, the display means is a liquid crystal display. The video communication mode is displayed on the liquid crystal display together with a received picture. In another embodiment, the video communication mode is displayed on the liquid crystal display together with a received picture only when the conditions of the radio channel are degraded.

Brief Description of Drawings

FIG. 1 is a block diagram of a radio video communication terminal according to the invention.

25 FIG. 2 is a block diagram of the baseband signal control unit (BB) in the radio video communication terminal of FIG. 1.

FIG. 3 is a flowchart illustrating the operation of the radio video communication terminal of the invention.

FIG. 4 is an exterior view of a radio video communication terminal according to an embodiment of the invention.

FIG. 5 is an exterior view of a radio video communication terminal according to another embodiment of the invention.

10 Best Mode for Carrying Out the Invention

Hereinafter, the embodiments of the present invention will be described with reference to the drawings.

FIG. 1 is a block diagram of a radio video communication terminal 100 according to an embodiment of the present invention. A radio section 1 is composed of an antenna (ANT) 11, a duplexer (DPX) 12, a transmitter (TX) 13, a receiver (RX) 14, and a synthesizer (SYN) 15. The radio video communication terminal 100 transmits and receives radio signals through the radio section 1.

A control section 2 is composed of a ROM 21, a RAM 22, and a baseband signal control unit (BB) 23. The ROM 21 is stored with various programs for controlling the operation of the terminal 100. The RAM 22 is a memory that stores various items of data (address book, originating call history, incoming call history, etc.).

These items of data are backed up by a battery (not shown). The BB 22 controls the entire radio video communication terminal 100.

An input-output section 3 is composed of a camera
5 (CAM) 31, a display driver (DRV) 32, a display unit
(LCD) 33, a microphone (MIC) 34, a speaker 35, a key
entry section (KEY) 36, a light emitting diode (LED) 37,
a sounder 38, and a vibrator (VIB) 39. The LCD 33
displays various items of data inputted by the user
10 with the KEY 36 and displays the video data received
through the radio section 1. The MIC 34 converts voice
of the user into an electric signal. The CAM 31
converts video data into an electric signal. The
speaker 35 outputs voice data received through the
15 radio section 1. An incoming call is informed with
sound emitted by the sounder 38, vibration of the VIB
39, and blinking of the LED 37. In FIG. 1 there is
illustrated components that radio video communication
terminals generally have; however, the LED 37 may be
20 omitted.

A power supply section 4 is composed of a power
supply (PS) 41, a charging circuit (CHG) 42, and a
battery (BAT) 43. The PS 41 supplies a stabilized
voltage as a supply voltage to the radio video
25 communication terminal 100.

The BB 23 in the radio video communication
terminal 100 of the present invention includes a

video communication mode detecting section 231 and
a video communication mode display instructing
section 232.

5 The video communication mode detecting section 231
is arranged to, when the terminal 100 is making video
communication, detect whether the video communication
mode is the motion picture communication mode in which
a motion picture is handled or the still picture
communication mode in which a still picture is handled.
10 In general, the communication mode is set by the user
at the transmitting end. Video data is displayed in
this communication mode on the LCD 33 of the radio
video communication terminal 100 at the receiving end.
That is, when the user at the transmitting end sets the
15 motion picture communication mode, a motion picture
is displayed on the LCD 33 of the radio video
communication terminal 100. When the user at the
transmitting end sets the still picture communication
mode, a still picture is displayed on the LCD 33.
20 However, the video communication mode can be changed in
the radio video communication terminal 100 at the
receiving end. That is, the communication in the
motion picture mode can be changed by the user at the
radio video communication terminal 100 at the receiving
25 end to communication in the still picture mode or voice
only.

 The video communication mode display instructing

section 232 instructs the LCD 33 to display whether the video communication mode detected by the video communication mode detecting section 231 is the motion picture communication mode or the still picture communication mode.

As a method of detecting the video communication mode by the video communication mode detecting section 231, a method is considered which is for the video communication mode detecting section 231 to detect information indicating a video communication mode specified in a communication protocol between the radio video communication terminal 100 and a base station (not shown).

The processes of the video communication mode detecting section 231 and the video communication mode display instructing section 232 are implemented by a CPU (not shown) in the BB 23 carrying out programs stored in the ROM 21.

Next, the operation of the radio video communication terminal 100 of the present embodiment will be described using a flowchart shown in FIG. 3.

The radio video communication terminal 100 first waits for an incoming call through the radio section 1 (step 11). When an incoming call arrives, the user is informed of it through the sounder 38 or the vibrator 39. When the user responds to this information (step 12), the reception of video data is started (step 13)

and motion picture data is displayed on the LCD 33.
Such control to display picture data received by the RX
14 on the LCD 33 is performed by the picture data
display control section 23a. The video communication
mode detecting section 231 in the BB 23 judges whether
5 the video communication mode is the motion picture
communication mode or the still picture communication
mode (step 14).

As the method for judging the video communication
10 mode, in addition to the previously described method, a
method can be used which sets a threshold for the
number of frames (pictures) received per second and
judges whether the video communication mode is the
motion picture mode or the still picture mode with
15 reference to the threshold. For example, suppose the
threshold to be 10 frames. Then, the communication
mode is judged to be the motion picture mode when the
number of frames received per second exceeds 100 frames
or to be the still picture mode when 100 frames are not
20 reached.

When the communication mode is the motion picture
communication mode, the video communication mode
display instructing section 232 instructs the LCD 33 to
display "MOTION" indicating the motion picture
25 communication mode (step 15). As a result, "MOTION"
indicating the motion picture communication mode is
displayed on the LCD 33 together with the motion

picture of the user at the transmitting end.

By such an operation of the radio video communication terminal 100, "MOTION" indicating the motion picture communication mode is displayed on the LCD 33, for example, even if the received field strength for the radio channel decreases and degraded still pictures are displayed on the LCD 33, which look like frames of a motion picture which is displayed in a frame step manner when communication is being made in the motion picture communication mode. Thereby, the user can be prevented from mistaking the video communication mode.

When motion picture data is displayed on the LCD 33 in the motion picture communication mode, the BB 23 judges whether or not a "STOP" key in the KEY 36 has been depressed to stop the motion picture (step 17). When the STOP key has been depressed, the BB 23 displays on the LCD 33 picture data at the time when the STOP key was depressed as a still picture. At this point, the video communication mode detecting section 231 detects that the video communication mode has changed to the still picture mode. In response to this detection, the video communication mode display instructing section 232 displays "STILL" indicating the still picture mode on the LCD 33 (step 21).

The detection of a change in the video communication mode as in step 17 includes detection of

a change in the video communication mode at the transmitting end. That is, the video communication mode detecting section 231 is allowed to, when the user at the transmitting end has changed the communication mode from the motion picture communication mode to the still picture communication mode, detect it.

The BB 23 judges whether a "TEMPORAL STOP" key for temporarily stopping the display of motion picture data was depressed in the KEY 36 (step 18). When the TEMPORAL STOP key was depressed, picture data at that time is displayed as a pause picture on the LCD 33. At this point, the video communication mode detecting section 231 detects that the video communication mode has changed to the temporal stop mode. In response to this detection, the video communication mode display instructing section 232 displays on the LCD 33 "TEMPORAL STOP" indicating that the picture display is in the temporal stop mode (step 19).

When the temporal stop is canceled by the user (step 20), the flow goes to step 15 in which the BB 23 displays motion picture data since that time on the LCD 33 and the video communication mode display instructing section 232 displays on the LCD 33 "MOTION" indicating that the video communication mode is the motion picture communication mode.

The display of a series of picture modes on the LCD 33 by the video communication mode display

instructing section 232 continues until motion picture data being received comes to an end (step 16).

On the other hand, when the video communication mode detecting section 231 detects in step 14 that
5 still picture data is being received, still picture data is displayed on the LCD 33 and "STILL" indicating the still picture communication mode is displayed on the LCD 33 by the video communication mode display instructing section 232 (step 21). And "STILL"
10 indicating the still picture communication mode is displayed on the LCD 33 until the reception of still picture data comes to an end (step 22).

The above embodiment was described as displaying "MOTION" at the time of motion picture communication mode, "TEMPORAL STOP" at the time of temporal stop in
15 the motion picture communication mode, and "STILL" at the time of still picture communication mode. However, it is also possible to display either of the video communication modes in such a way that, for example, "MOTION" is displayed on the LCD 33 only at the time of
20 motion picture communication mode including temporal stop and no video communication mode is displayed on the LCD 33 at the time of still picture mode. Also, at the time of motion picture communication mode, "MOTION" may be displayed on the LCD 33 only when the conditions
25 of the radio channel are degraded.

Moreover, it is also possible to inform the user

of the video communication mode through the VIB 39 or
backlight of the KEY 36. That is, the user can be
informed of the video communication mode by vibrating
the VIB 39 or turning on the built-in backlight of the
5 KEY 36 at the time of motion picture communication mode.

FIG. 4 is an exterior view of a radio video
communication terminal 100 according to an embodiment
of the present invention. In FIG. 4, at the time of
motion picture communication in the motion picture
10 communication mode, a motion picture is displayed on
the LCD 33 and "MOTION" indicating that the video
communication mode is the motion picture communication
mode is further displayed.

FIG. 5 is an exterior view of a radio video
15 communication terminal 100 according to another
embodiment of the present invention. In this
embodiment, the current video communication mode is
displayed by turning on a corresponding one of LEDs in
an LED display 37, not on the LCD 33.

20 As described above, in the radio video
communication terminal 100 of the present invention,
when communication is made in the motion picture
communication mode, even if degraded still pictures due
to degradation in the radio channel conditions are
25 received and displayed on the LCD 33, which look like
frames of a motion picture which is displayed in a
frame step manner, "MOTION" indicating that the video

communication mode is the motion picture communication mode is displayed. Thereby, the user is always allowed to recognize the video communication mode correctly.

5 A degradation in the radio channel conditions is detected by a received field strength (RSSI) detector 14a provided in the RX 14 of FIG. 1, and the result is presented to the BB 23. It is also possible to detect a degradation in the radio channel conditions by an FER (frame error rate) detector 23b provided in the BB 23
10 and present the result to the BB 23.

When motion picture communication transmitted from a terminal with which the connection has been set up or a repeater station such as a base station is stopped, the video communication mode detecting section 231
15 detects it and detects a subsequent video communication mode. In response to this detection, the video communication mode display instructing section 213 displays the subsequent communication mode on the LCD 33. Therefore, the user is always allowed to recognize
20 the video communication mode correctly.

The present invention is applicable in the radio video communication terminals regardless of the type of the radio communication system, the coding system, and the modulation system.

C L A I M S

1. A radio video communication terminal which communicates video over a radio channel in a motion picture communication mode or a still picture communication mode, comprising:

video communication mode detecting means for detecting a video communication mode in which the terminal is communicating; and

informing means for informing a user at the terminal of the video communication a mode detected by the video communication mode detecting means.

2. The radio video communication terminal according to claim 1, further comprising display means for displaying received video data, wherein the informing means displays the detected video communication mode on the display means.

3. The radio video communication terminal according to claim 1, further comprising first display means for displaying received video data and second display means for displaying the detected video communication mode.

4. The radio video communication terminal according to claim 1, further comprising radio channel quality detecting means for detecting the quality of the radio channel, wherein, when the radio channel quality detecting means detects a degradation in the quality of the radio channel, the informing means

informs the user of a detected video communication mode.

5 5. The radio video communication terminal according to claim 1, wherein the video communication mode detecting means includes means for detecting a stop of the motion picture communication mode of the communication over the radio channel and detects a communication mode after the detection of the stop, and the informing means informs the user of the detected communication mode.

10 6. A radio video communication terminal which communicates video over a radio channel in a motion picture communication mode or a still picture communication mode, comprising:

15 radio communication means including transmitting means for transmitting information containing video information over the radio channel and receiving means for receiving information containing video information over the radio channel;

20 input means for inputting data for controlling the operation of the radio communication terminal;

 display means for displaying the inputted data and information containing picture data received by the radio communication means;

25 first display control means for controlling the display means so as to display the image data received by the radio communication means;

 video communication mode detecting means for

detecting a video communication mode in which the terminal is communicating; and

second display control means for controlling the display means so as to display the video communication mode detected by the video communication mode detecting means.

7. The radio video communication terminal according to claim 6, wherein the display means includes an LCD and LEDs and the second display control means displays the video communication mode with the LEDs.

8. The radio video communication terminal according to claim 6, wherein the input means includes means for inputting a change in the video communication mode in the terminal, when the video communication mode is changed by the input, the video communication mode detecting means detects a video communication mode after the change, and in response to this detection the second display control means displays the video communication mode after the change on the display means.

9. The radio video communication terminal according to claim 6, wherein the video communication mode detecting means includes means for detecting a change in the video communication mode made by a person at the transmitting end.

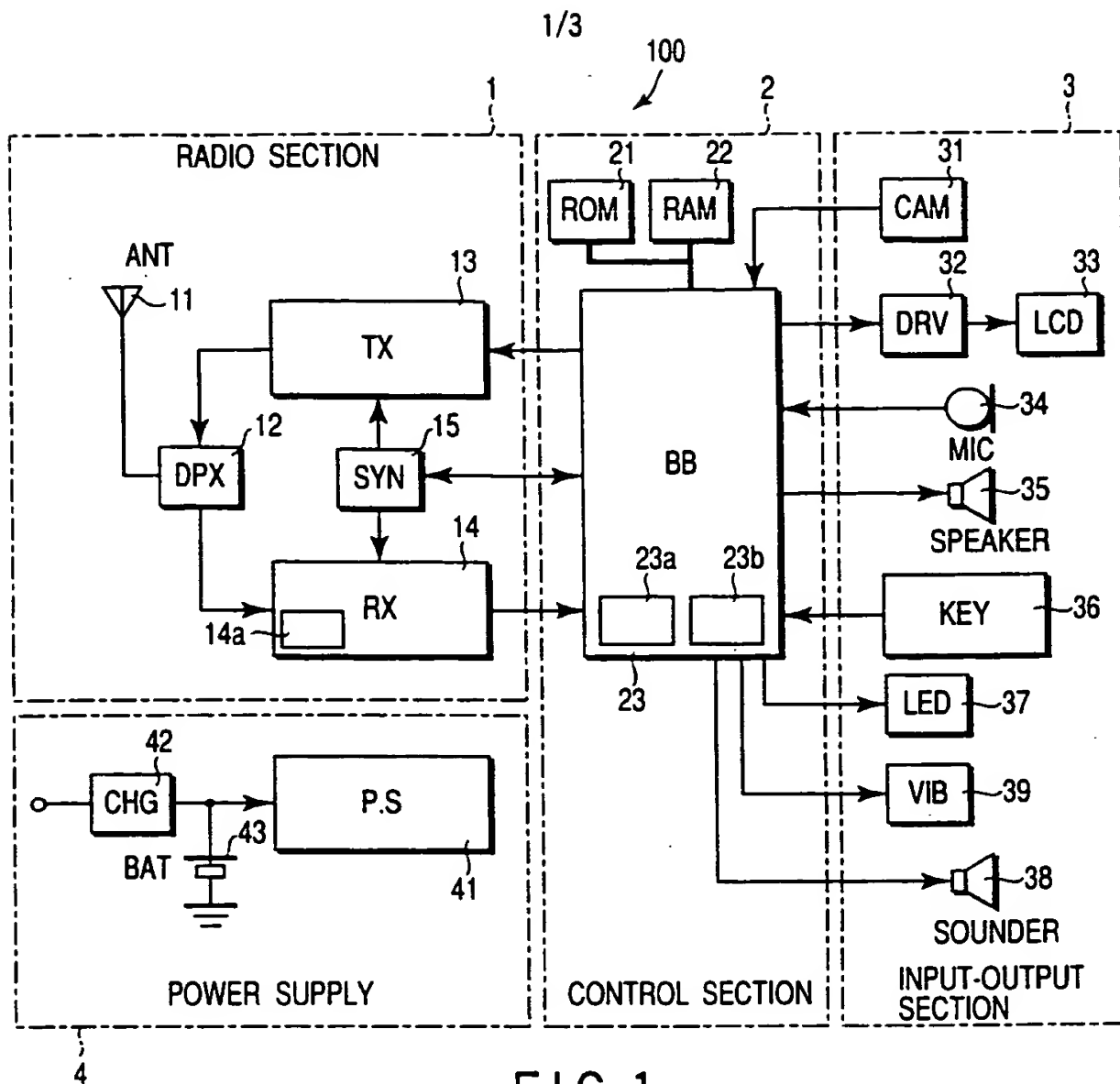


FIG. 1

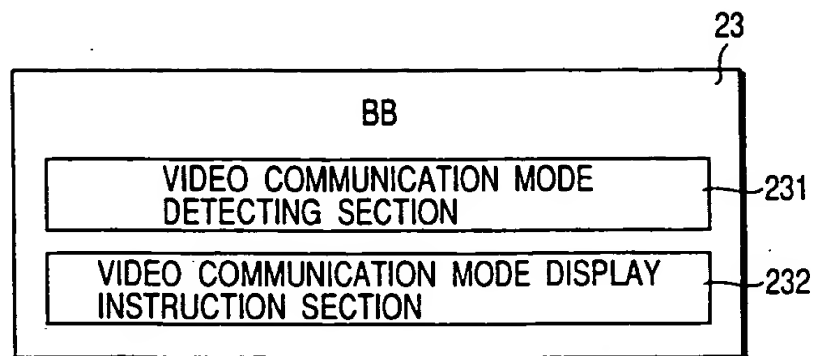


FIG. 2

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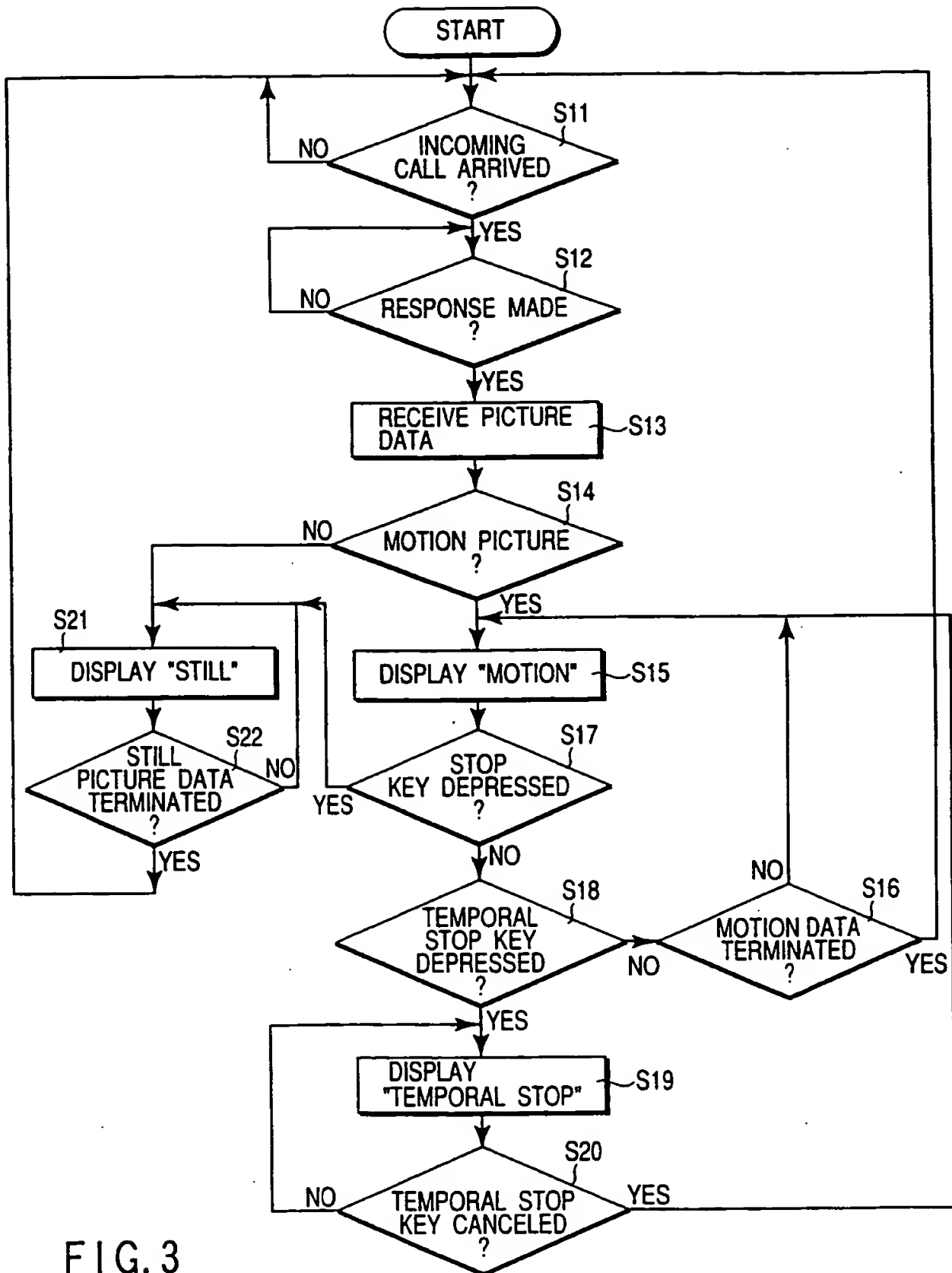


FIG. 3

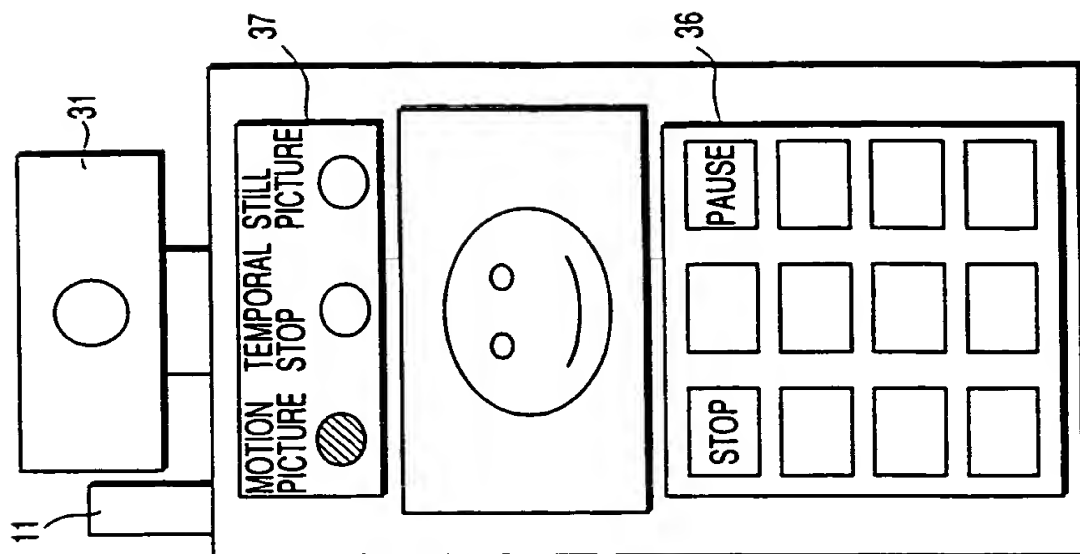


FIG. 5

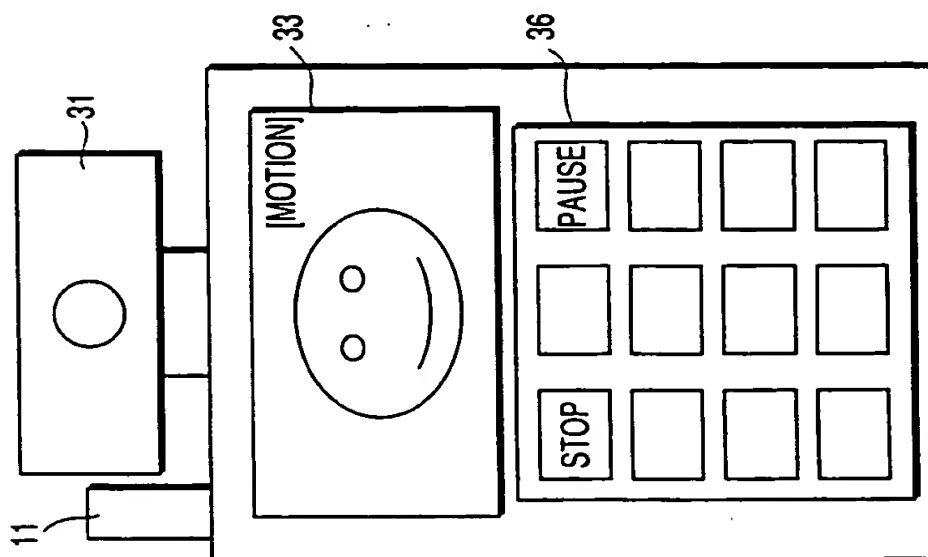


FIG. 4

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/JP 00/06500

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N7/14

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

PAJ, WPI Data, EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 015, no. 258 (E-1084), 28 June 1991 (1991-06-28) & JP 03 082257 A (CANON INC), 8 April 1991 (1991-04-08) abstract	1, 5, 6, 8
A	PATENT ABSTRACTS OF JAPAN vol. 018, no. 566 (E-1622), 28 October 1994 (1994-10-28) & JP 06 205405 A (CANON INC), 22 July 1994 (1994-07-22) abstract	1, 6

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

8 January 2001

Date of mailing of the international search report

12/01/2001

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/JP 00/06500

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 5 751 445 A (MASUNAGA MAKOTO) 12 May 1998 (1998-05-12) column 1, line 1 - line 56 column 2, line 16 -column 4, line 47; figure 1</p> <p style="text-align: center;">-----</p>	1,2,6

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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